

INTERNATIONAL RECTIFIER



# 1N3879, 1N3889, 6FL, 12FL, 16FL SERIES

6A, 12A and 16A Fast  
Recovery Rectifiers

## Major Ratings and Characteristics

	1N3879 -1N3883	1N3889 -1N3893	6FL...	12FL...	16FL...	Unit
I(F(AV)) <sup>†</sup>	6*	12*	6	12	16	A
IFSM	50Hz 50Hz	72 75*	145	110	145	A
I <sub>z</sub> <sup>t</sup>	50Hz 60Hz	26 23	103	60	103	A <sup>2</sup> s
I <sub>r</sub> t		363	1452	855	1452	A <sup>2</sup> √s
T <sub>rr</sub> range	see table				ns	
V <sub>RRM</sub> range	50 - 400*		50 - 1000		V	
T <sub>j</sub> range	-65 to 150				°C	

\* JEDEC registered values.

† At max. T<sub>C</sub> = 100°C.

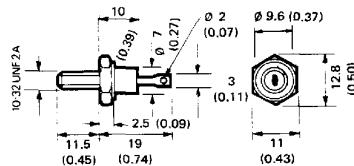
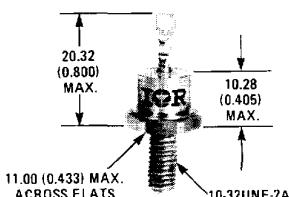
## Description

This range of fast recovery diodes is designed for applications in DC power supplies, inverters, converters, choppers, ultrasonic systems and for use as free wheel diodes.

## Features

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Types up to 1000V V<sub>RRM</sub>
- Fully characterised reverse recovery conditions

## CASE STYLE AND DIMENSIONS



Conforms to JEDEC : DO-203AA (DO-4)

IEC 191-2 : A3U

BS 3934 : SO-10A

DIN 41885 : 101 C 2

All dimensions in millimetres (inches)

## REVERSE VOLTAGE RATINGS

Part Number	① ②	VR <sub>RM</sub> — Max. Repetitive Peak Reverse Voltage	VR <sub>RM</sub> — Max. Non-Repetitive Peak Reverse Voltage $t_p \leq 5$ ms	I <sub>R</sub> — Max. Reverse Current At Rated V <sub>R</sub>		
				T <sub>J</sub> = 25°C	T <sub>J</sub> = 100°C	T <sub>J</sub> = 150°C
1N3879		50	75	0.015*	1.0*	3.0*
1N3880		100	150	0.015*	1.0*	3.0*
1N3881		200	250	0.015*	1.0*	3.0*
1N3882		300	350	0.015*	1.0*	3.0*
1N3883		400	450	0.015*	1.0*	3.0*
1N3889		50	75	0.025*	3.0*	5.0*
1N3890		100	150	0.025*	3.0*	5.0*
1N3891		200	250	0.025*	3.0*	5.0*
1N3892		300	350	0.025*	3.0*	5.0*
1N3893		400	450	0.025*	3.0*	5.0*
6FL5S02	6FL5S05	6FL5S10	50	75	0.050	—
6FL10S02	6FL10S05	6FL10S10	100	150	0.050	—
6FL20S02	6FL20S05	6FL20S10	200	275	0.050	—
6FL40S02	6FL40S05	6FL40S10	400	500	0.050	—
6FL60S02	6FL60S05	6FL60S10	600	725	0.050	—
—	6FL80S05	6FL80S10	800	950	0.050	—
—	6FL100S05	6FL100S10	1000	1250	0.050	—
12FL5S02	12FL5S05	12FL5S10	50	75	0.050	—
12FL10S02	12FL10S05	12FL10S10	100	150	0.050	—
12FL20S02	12FL20S05	12FL20S10	200	275	0.050	—
12FL40S02	12FL40S05	12FL40S10	400	500	0.050	—
12FL60S02	12FL60S05	12FL60S10	600	725	0.050	—
—	12FL80S05	12FL80S10	800	950	0.050	—
—	12FL100S05	12FL100S10	1000	1250	0.050	—
16FL5S02	16FL5S05	16FL5S10	50	75	0.050	—
16FL10S02	16FL10S05	16FL10S10	100	150	0.050	—
16FL20S02	16FL20S05	16FL20S10	200	275	0.050	—
16FL40S02	16FL40S05	16FL40S10	400	500	0.050	—
16FL60S02	16FL60S05	16FL60S10	600	725	0.050	—
—	16FL80S05	16FL80S10	800	950	0.050	—
—	16FL100S05	16FL100S10	1000	1250	0.050	—

## REVERSE RECOVERY CHARACTERISTICS

	1N3879 — 1N3883	6FL...			12FL...			16FL...			Unit	Conditions	
		S02	S05	S10	S02	S05	S10	S02	S05	S10			
t <sub>r</sub>	Max. reverse recovery time	150	150	110	285	490	100	250	430	90	225	390	ns
		300*	300*	200	500	1000	200	500	1000	200	500	1000	$t_J = 25^\circ\text{C}$ , $I_F = 1\text{A}$ to $V_R = 30\text{V}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$
I <sub>RM</sub> (REC)	Max. peak recovery current	4*	5*	—	—	—	—	—	—	—	—	—	$I_{FM} = \pi \times \text{rated } I_F(\text{AV})$
		400	350	230	1700	5000	200	1300	3800	150	1100	3000	nC
ORR	Max. reverse recovered charge	400	400	200	1200	5000	200	1200	5000	200	1200	5000	nC
		400	400	200	1200	5000	200	1200	5000	200	1200	5000	$t_J = 25^\circ\text{C}$ , $dI_F/dt = 25\text{ A}/\mu\text{s}$ $ I_{FM}  = \pi \times \text{rated }  I_F(\text{AV}) $

## ELECTRICAL SPECIFICATIONS

	1N3879 — 1N3883	6FL...	1N3889 — 1N3893	12FL...	16FL...	Unit	Conditions
<b>FORWARD CONDUCTION</b>							
I <sub>F</sub> (AV)	Max. average forward current	6*	6	12*	16	A	180° conduction, half sine wave, $T_C = 100^\circ\text{C}$
I <sub>F</sub> (RMS)	Max. r.m.s. forward current	9.5	9.5	19	25	A	
I <sub>FSM</sub>	Max. peak one-cycle non-repetitive forward current	72	110	145	180	A	$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ With rated VR <sub>RM</sub>
	75*	115	150*	190			$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ VR <sub>RM</sub> = 0
	85	130	170	215			
	90	135	180	225			
I <sub>2t</sub>	Max. $I^2t$ for fusing	26	60	103	180		$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ With rated VR <sub>RM</sub>
	23	55	94	150			$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ VR <sub>RM</sub> = 0
	36	88	145	230			
	33	78	130	210			
I <sub>2t</sub> √t	Max. $I^2\sqrt{t}$ for individual device fusing	363	856	1452	2290	$I^2\sqrt{t}$	$t = 0.1$ to 10 ms
V <sub>FM</sub>	Max. peak forward voltage	1.4*	1.4	1.4*	1.4	V	$t_J = 25^\circ\text{C}$ , $I_F = \text{rated } I_F(\text{AV})$ (D.C.)
		1.5*	1.5	1.5*	1.5		$T_C = 100^\circ\text{C}$ , $ I_{FM}  = \pi \times \text{rated }  I_F(\text{AV}) $

\*JEDEC registered value.

\*\*Suffix "SO2" may be omitted, i.e., 12FL10 implies 12FL10S02,

12FL60 implies 12FL60S02.

①Types listed are cathode to case; for anode-to-case include "R" in code, i.e., 1N3879R, 6FLR20S10, 16FLR40S02.

①I<sub>R</sub>(AV) @ rated  $|I_F(\text{AV})|$  and VR<sub>RM</sub>, and  $T_C = 100^\circ\text{C}$ .②VR<sub>RM</sub> @ rated VR<sub>RM</sub> and  $t_J = 150^\circ\text{C}$ .③I<sub>2t</sub> for time  $t_X = I^2\sqrt{t} \cdot \sqrt{X}$ 

④When these devices are ordered without a suffix, e.g., 40HFL, the order will be filled with devices that meet the SO2 specification.



## Thermal and mechanical specifications

	1N3879 -1N3883 6FL...	1N3889 -1N3893 12FL...	16FL...	Units	Conditions
T <sub>J</sub>	Junction operating temperature range	-65 to 150		°C	
T <sub>stg</sub>	Storage temperature range	-65 to 175		°C	
R <sub>thJC</sub>	Maximum internal thermal resistance, junction to case	2.5	2.0	1.6	deg C/W DC operation
R <sub>thCS</sub>	Maximum thermal resistance, case to heatsink		0.5	deg C/W	Mounting surface flat, smooth and greased.
T	Mounting torque to nut ± 10%	10.5		lbf.in	Lubricated threads
		0.12		kgf.m	(Non-lubricated threads)
	to device	1.2		Nm	
		11.5 (13.5)		lbf.in	
0.13 (0.155)			kgf.m		
wt	Approximate weight	1.3 (1.35)		Nm	
		0.25		oz	
	Case style	DO-203AA (DO-4)			JEDEC

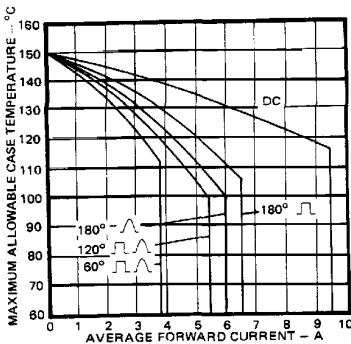


Fig. 1 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

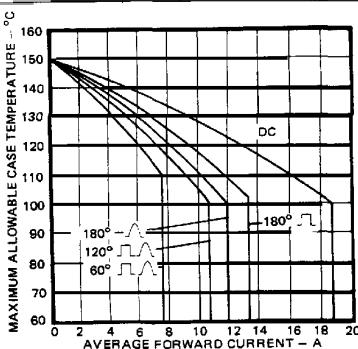


Fig. 2 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

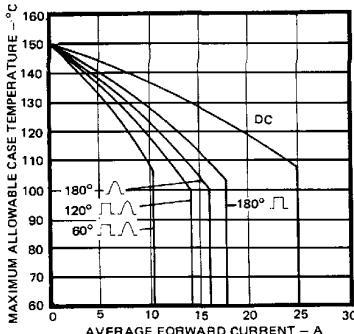
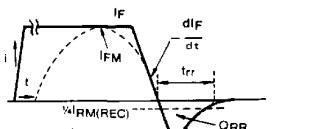


Fig. 3 — Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series



$I_F$ ,  $I_{FM}$  = Peak forward current prior to commutation

$-dI_F/dt$  = Rate of fall of forward current

$|IRM(REC)|$  = Peak reverse recovery current

$t_{rr}$  = Reverse recovery time

$Q_{RR}$  = Reverse recovered charge

Fig. 4 — Reverse Recovery Time Test Waveform

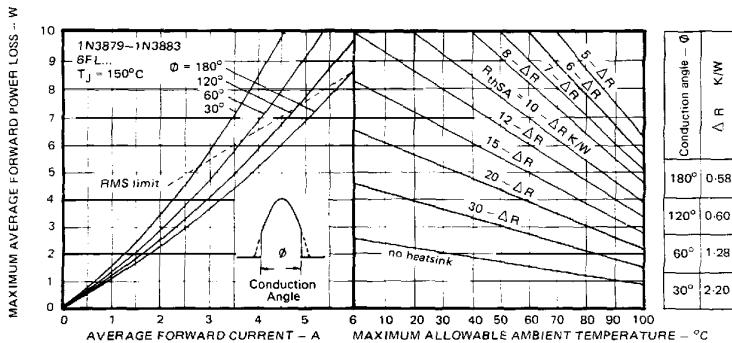


Fig. 5 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

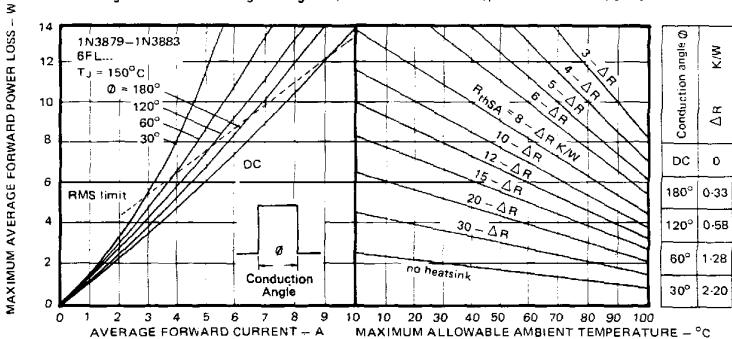


Fig. 6 – Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

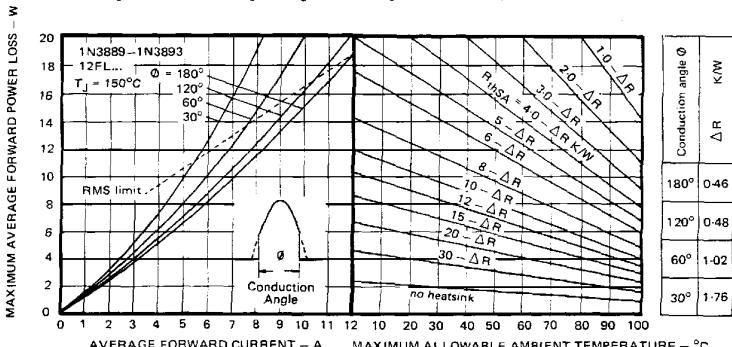


Fig. 7 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

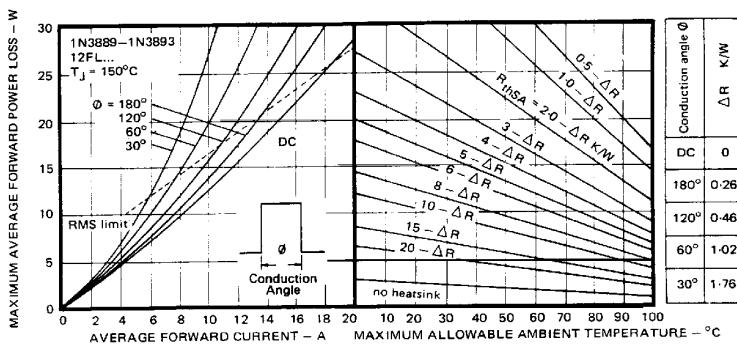


Fig. 8 — Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

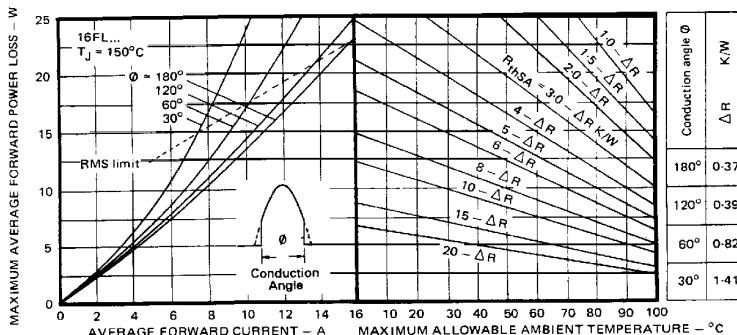


Fig. 9 — Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

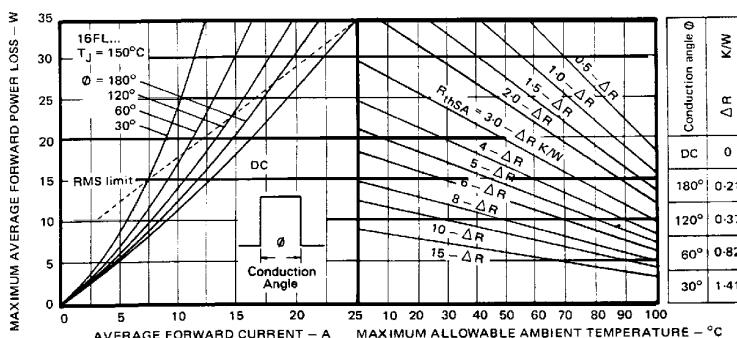


Fig. 10 — Current Rating Nomogram (Rectangular Waveforms), 16FL Series

**1N3879, 1N3889, 6FL, 12FL, 16FL Series**

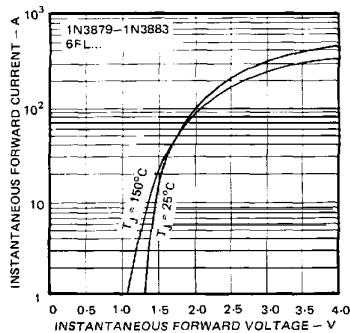


Fig. 11 — Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

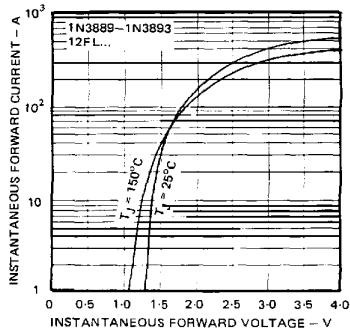


Fig. 13 — Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

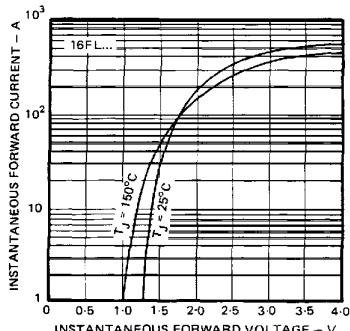


Fig. 15 — Maximum Forward Voltage Vs. Forward Current, 16FL Series

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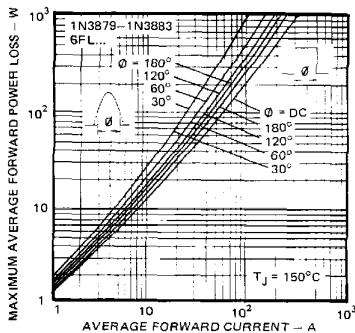


Fig. 12 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

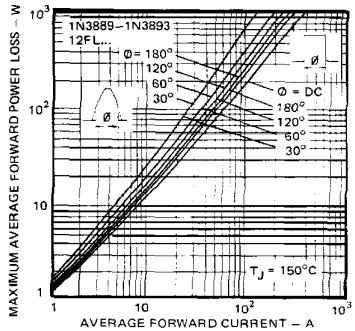


Fig. 14 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

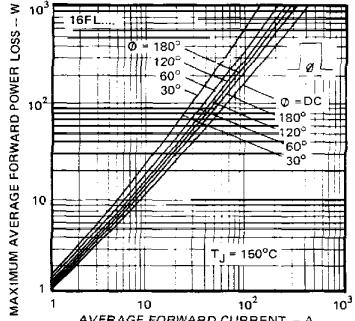


Fig. 16 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series



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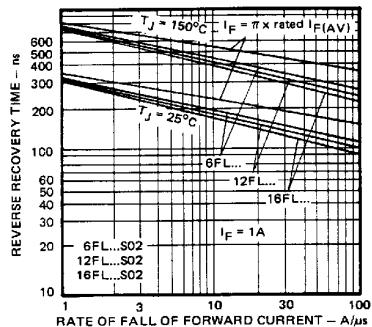


Fig. 17A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S02

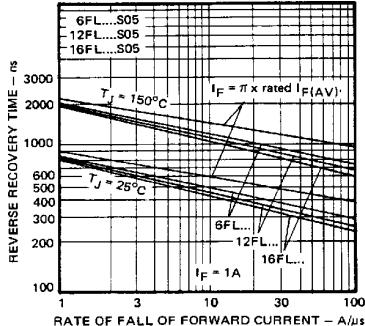


Fig. 18A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S05

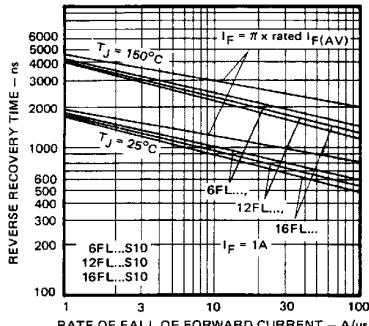


Fig. 19A — Maximum Reverse Recovery Time Vs.  
Rate of Fall of Forward Current, All Series \_S10

**1N3879, 1N3889, 6FL, 12FL, 16FL Series**

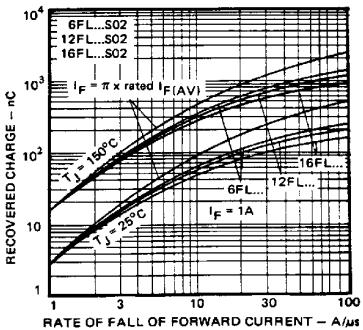


Fig. 17B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S02

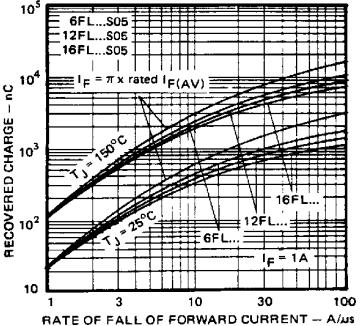


Fig. 18B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S05

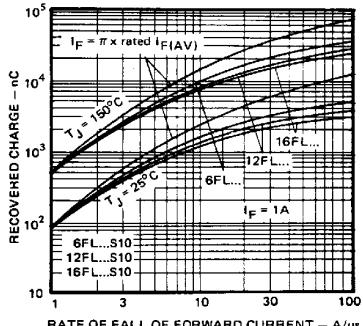


Fig. 19B — Maximum Recovered Charge Vs. Rate of  
Fall of Forward Current, All Series \_S10

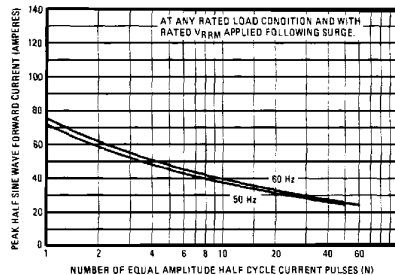


Fig. 20 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

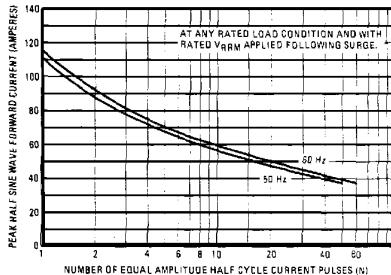


Fig. 21 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

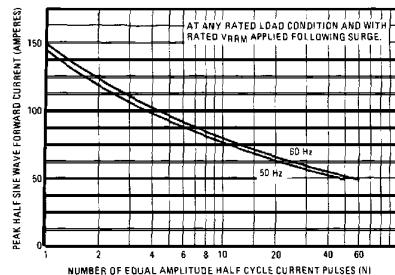
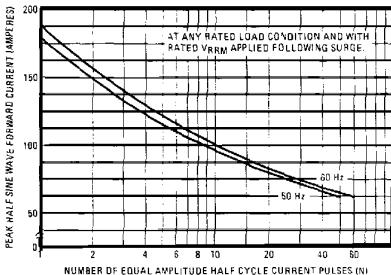
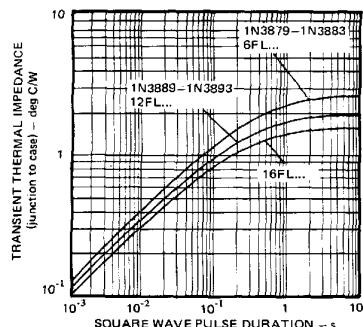
Fig. 22 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses,  
1N3889 and 12FL Series

Fig. 23 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

Fig. 24 — Maximum Transient Thermal Impedance,  
Junction-to-Case Vs. Pulse Duration, All Series.